REMARKS

Claims 1-16 are pending in this application. By this Amendment, claims 1 and 6 are amended to correct various typographical and syntactical errors. Support for these amendments can be found in the claims as originally filed. Claims 12 and 16 are amended to reflect the structural element related to the calculation steps contained in these claims. Support for these amendments can be found in the specification as filed, for example in paragraphs [0054] and [0055].

In addition, Figures 9-11 are replaced to properly designate the subject matter of those figures as prior art. Support for these designations can be found in the specification as filed, for example, at paragraph [0065].

Paragraphs [0019], [0042], [0046], [0067], [0070], [0081], [0082], [0110] and [0114] of the specification are amended to correct certain informalities and typographical errors. Support for the amendments to the specification can be found in the specification as originally filed. Thus, no new matter is added by these amendments.

I. Objections to the Drawings

The Office Action objects to Figures 9-11 as illustrating only what is old. By this Amendment, Replacement Drawing Sheets with Figures 9-11 are submitted. Figures 9-11 have been corrected to contain a legend designating Figures 9-11 as "Prior Art". Accordingly, reconsideration and withdrawal of this objection is respectfully requested.

II. Objections to the Specification

The Office Action objects to the specification because of certain informalities. By this Amendment, paragraphs [0019], [0046], [0067] and [0082] are replaced with rewritten paragraphs that have been corrected in light of the Office Action. Paragraphs [0042], [0070], [0081], [0110] and [0114] are likewise replaced due to additional typographical errors found

during Applicants' review of the specification in light of the Office Action. Accordingly, reconsideration and withdrawal of this objection is respectfully requested.

III. Objections to the Claims

The Office Action objects to claims 1, 3-6, 8, 9, 12 and 16 because of certain informalities. By this Amendment, claims 1, 6, 12 and 16 are amended to correct informalities in these claims, and claims 3-5, 8 and 9 are corrected by virtue of their dependencies on the amended claims. Accordingly, reconsideration and withdrawal of this objection is respectfully requested.

Further, Applicants gratefully acknowledge the indication in the Office Action that claims 5, 12 and 16, objected to as dependent upon a rejected base claim, would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants also gratefully acknowledge the reasons for the indication of allowable subject matter provided. In light of the amendments to claims 1 and 16 and the arguments below, Applicants respectfully submit that the applicable base and intervening dependent claims are allowable and thus that claims 5, 12 and 16 depend from allowable claims. Accordingly, Applicants submit that claims 5, 12 and 16 are allowable as written, and respectfully request reconsideration and withdrawal of this objection.

IV. Rejections of the Claims

A. Mitsui in view of Holkeboer

The Office Action rejects claims 1-4, 6, 8, 9, 13 and 14 under 35 U.S.C. §103(a) over U.S. Patent 4,948,962 to Mitsui et al. in view of U.S. Patent 5,889,281 to Holkeboer et al. Applicants respectfully traverse this rejection.

Independent claim 1 sets forth a "method of ion attachment mass spectrometry causing positively charged metal ions to attach to a gas to be detected in a reduced pressure atmosphere to ionize the gas for measurement of mass spectrometry, comprising: a step of

utilizing a property that sensitivity of each component of said gas has dependency on a total pressure of said reduced pressure atmosphere and that said dependency on the total pressure differs for each component, and a step of performing a quantitative analysis while using the total pressure data of said reduced pressure atmosphere measured on mass spectrometry for processing of mass spectrometry data of said each component." Independent claim 2 sets forth a similar method, "comprising: a step of utilizing a property that sensitivity of each component of said gas has dependency on a total pressure of said reduced pressure atmosphere and that said dependency on the total pressure differs for each component, and a step of performing a quantitative analysis while using the total pressure data of said reduced pressure atmosphere measured on mass spectrometry for setting measurement conditions for mass spectrometry of said each component." Independent claim 6 sets forth an "apparatus for ion attachment mass spectrometry for measurement of mass spectrometry provided with: a reaction chamber for causing positively charged metal ions to attach to a gas to be detected; a mass spectrometer for separating and detecting said gas to which the positively charged metal ions are attached; an analysis chamber in which said mass spectrometer is placed; an introduction mechanism for introducing gases containing said gas to be detected into said reaction chamber; an evacuation mechanism for evacuating the gases containing said gas to be detected; a data processor for receiving and processing a mass signal from said mass spectrometer; wherein the measurement of mass spectrometry on said gas to be detected is performed after causing the positively charged metal ions to attach to said gas to be detected to ionize it through said reaction chamber and analysis chamber with a reduced pressure atmosphere; further comprising a vacuum gauge for measuring a total pressure of said reduced pressure atmosphere; wherein a total pressure signal from said vacuum gauge measured during the measurement is input to said data processor, and said data processor includes a processing means for performing a quantitative analysis of each component

utilizing the fact that sensitivity of said each component has dependency on the total pressure of said reduced pressure atmosphere and that the dependency on total pressure differs for said each component." Claims 3, 4, 8, 9, 13 and 14 are dependent, directly or indirectly, upon claims 1, 2 or 6.

Mitsui describes a "sample introduced into plasma is ionized with plasma in plasma ion source mass spectrometer." Mitsui, col. 2, lines 64-65. That is, Mitsui relates to mass spectrometry in which the sample is ionized with a plasma ion source.

In contrast to claims 1 and 2, Mitsui teaches plasma ion source mass spectrometry wherein the sample is ionized with the plasma ion source. Claims 1 and 2 set forth a method of ion attachment mass spectrometry causing positively charged metal ions to attach to a gas to be detected in a reduced pressure atmosphere to ionize the gas for measurement of mass spectrometry. That is, claims 1 and 2 relate to a method of ionizing a sample gas using the ion attachment by a positively charged metal ion. Claim 6 sets forth an apparatus for ion attachment mass spectrometry. In ion attachment mass spectrometry, the sample is ionized by the attachment of positively charged metal ions, to form ions having the formula [Sample]Metal$^+$. In plasma ion source ionization mass spectrometry, such as described in Mitsui, the sample is ionized along with the plasma carrier. The method and apparatus for plasma ion source mass spectrometry as in Mitsui and for ion attachment mass spectrometry as claimed are distinct and different. Mitsui does not disclose, teach or suggest ion attachment mass spectrometry or the necessary apparatus. Mitsui does not teach or suggest that the disclosed method or apparatus could or should be modified to practice ion attachment mass spectrometry as claimed.

Further, the Office Action admits that Mitsui does not disclose, teach or suggest a step of utilizing a property that sensitivity of each component of said gas has dependency on a total pressure of said reduced pressure atmosphere and that said dependency on the total

pressure differs for each component, and a step of performing a quantitative analysis while using the total pressure data of said reduced pressure atmosphere measured on mass spectrometry for processing of mass spectrometry data of said each component or a step of performing a quantitative analysis while using the total pressure data of said reduced pressure atmosphere measured on mass spectrometry for setting measurement conditions for mass spectrometry of said each component, as in claims 1 and 2. The Office Action also admits that Mitsui does not disclose, teach or suggest a method including a step that a quantitative value is calculated for each component using the sensitivity and mass signal, as in claims 3, 9 and 13, that the total pressure during measurement is set within an allowable fluctuation, as in claims 4 and 14, or an apparatus including a vacuum gauge for measuring a total pressure of said reduced pressure atmosphere; wherein a total pressure signal from said vacuum gauge measured during the measurement is input to said data processor, and said data processor includes a processing means for performing a quantitative analysis of each component utilizing the fact that sensitivity of said each component has dependency on the total pressure of said reduced pressure atmosphere and that the dependency on total pressure differs for said each component, as in claim 6.

Thus, Mitsui alone could not have rendered claims 1-4, 6, 8, 9, 13 and 14 obvious. Combining Mitsui with Holkeboer does not remedy the shortcomings of Mitsui.

Holkeboer teaches quadrupole mass spectrometry, and specifically the method for linearizing the sensitivity of the ion current. Holkeboer teaches that the sample for quadrupole mass spectrometry is ionized using electrons from an electron emitter.

As described above, claims 1 and 2 set forth a method of ion attachment mass spectrometry causing positively charged metal ions to attach to a gas to be detected in a reduced pressure atmosphere to ionize the gas for measurement of mass spectrometry. That is, claims 1 and 2 relate to a method of ionizing a sample gas using the ion attachment by a

positively charged metal ion. The claimed method of ion attachment mass spectrometry and the apparatus for the method are distinct from Holkeboer's method of electron ionization mass spectrometry and the apparatus necessary for that method. In ion attachment mass spectrometry, the sample is ionized by the attachment of positively charged metal ions, to form ions having the formula [Sample]Metal^{+}. In electron ionization mass spectrometry, the sample is fragmented by electrons, and the fragments are analyzed by the mass spectrometer. Thus, the method and apparatus, such as that set forth in claim 6, for ion attachment mass spectrometry differ from and are not disclosed, taught or suggested by electron ionization mass spectrometers or electron ionization mass spectrometry. Nowhere does either Mitsui or Holkeboer teach or suggest that the different analysis methods and apparati could or should be combined together, or that the resultant combination could or should thereafter be modified to practice the claimed invention.

Further, Holkeboer does not disclose, teach or suggest a "step of utilizing a property that sensitivity of each component of said gas has dependency on a total pressure of said reduced pressure atmosphere and that said dependency on the total pressure differs for each component, and a step of performing a quantitative analysis while using the total pressure data of said reduced pressure atmosphere measured on mass spectrometry for processing of mass spectrometry data of said each component or a step of performing a quantitative analysis while using the total pressure data of said reduced pressure atmosphere measured on mass spectrometry for setting measurement conditions for mass spectrometry of said each component", as in claims 1 and 2, in contrast to the assertion in the Office Action.

Thus, Mitsui and Holkeboer, alone or in combination, would not have rendered claims 1-4, 6, 8, 9, 13 and 14 obvious. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

B. Mitsui in view of Mowry

The Office Action rejects claims 7, 10, 11 and 15 under 35 U.S.C. §103(a) over U.S. Patent 4,948,962 to Mitsui et al. in view of U.S. Patent 5,962,774 to Mowry et al. Applicants respectfully traverse this rejection.

Claim 7 sets forth an "apparatus for ion attachment mass spectrometry for measurement of mass spectrometry provided with: a reaction chamber for causing positively charged metal ions to attach to a gas to be detected; a mass spectrometer for separating and detecting said gas to which the positively charged metal ions are attached; an analysis chamber in which said mass spectrometer is placed; an introduction mechanism for introducing gases containing said gas into said reaction chamber; an evacuation mechanism for evacuating the gases containing said gas to be detected; a data processor for receiving and processing a mass signal from said mass spectrometer; wherein the measurement of mass spectrometry on said gas to be detected is performed after causing the positively charged metal ions to attach to said gas to ionize it through said reaction chamber and analysis chamber with a reduced pressure atmosphere; further comprising a vacuum gauge for measuring a total pressure of said reduced pressure atmosphere; wherein a total pressure signal from said vacuum gauge measured during the measurement is input to said introduction mechanism or said evacuation mechanism, and said data processor performs a quantitative analysis of said each component." Claims 10, 11 and 15 are dependent, directly or indirectly, upon claim 7.

For at least the same reasons discussed above with respect to claims 1-4, 6, 8, 9, 13 and 14, Mitsui alone could not have rendered claims 7, 10, 11 and 15 obvious. The combination with Mowry does not remedy the shortcomings of Mitsui.

Mowry discloses a means for measuring in real time the volatile organic compounds present in a gaseous sample. Mowry discloses, as a means for measuring the amount of

volatile organic compounds in a sample, the use of a mass spectrometer, specifically a chemical ionization mass spectrometer. Mowry does not disclose, teach or suggest the use of ion attachment mass spectrometry, as in claims 7, 10, 11 and 15.

Claim 7 sets forth an apparatus for ion attachment mass spectrometry for measurement of mass spectrometry. The apparatus used for ion attachment mass spectrometry are distinct from the apparatus used for chemical ionization mass spectrometry. In ion attachment mass spectrometry, the sample is ionized by the attachment of positively charged metal ions, so that ions of the formula [Sample]Metal$^+$ are formed. In chemical ionization mass spectrometry, the sample is reacted with a reagent molecule, such as CH_5^+, which transfers a proton to form ions of the formula [Sample]H^+. Different ionization techniques are required to form metal ions as opposed to chemical reagent ions such as CH_5^+, and different physical environments are used to form the ions in each respective technique. Thus, the apparatus for ion attachment mass spectrometry, as in claim 7, differ from and are not disclosed, taught or suggested by chemical ionization mass spectrometers or chemical ionization mass spectrometry as taught by Mowry. Accordingly, the apparatus of Mowry differs from that of claim 7 and does not cure the shortcomings of Mitsui.

Thus, Mitsui and Mowry, alone or in combination, would not have rendered claims 7, 10, 11 and 15 obvious. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

V. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-16 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

James A. Oliff
Registration No. 27,075

Julie M. Seaman
Registration No. 51,156

JAO:JMS/jms

Attachment:
Replacement Drawing Sheets
Petition for Three Month Extension of Time

Date: August 13, 2003

OLIFF & BERRIDGE, PLC
P.O. Box 19928
Alexandria, Virginia 22320
Telephone: (703) 836-6400

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